**DARPA**

**Communicator**

**Intelligent Collaboration & Visualization**

**Information Management**

- **Information Management**
  - Situation Analysis
- **Collaboration**
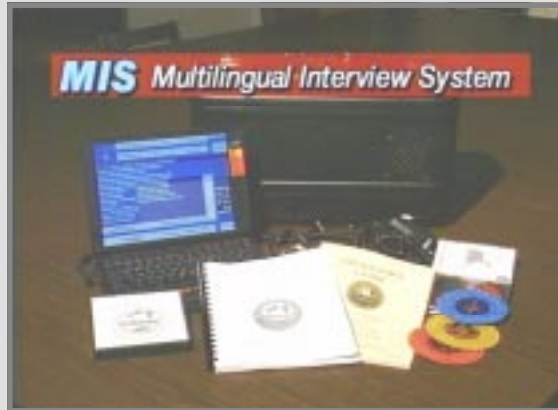  - Shared Workspaces
- **Communicator**
  - Dialog

Allen Sears

# Translingual Communication

# Bosnian One Way

## Dragon Systems collaboration…using Dragon Dictate

- 60,000 words and 8,000 phrases
- Phrases as words
- Final recognition rate near 94% using 10 minute adaptation

## Extensive Field Tests

- Iterative testing with users at Ft. Bragg Military Intelligence Brigade
- Five units deployed to Bosnia in May 1997

## Consequent Redesign Per Operator Feedback

- Hand-held unit emphasis
- Redeployed in November 1997 with PsyOps and Military Intelligence

# What is Jupiter?

**A telephone-only conversational interface for weather info**

**Based on the GALAXY client-server architecture**

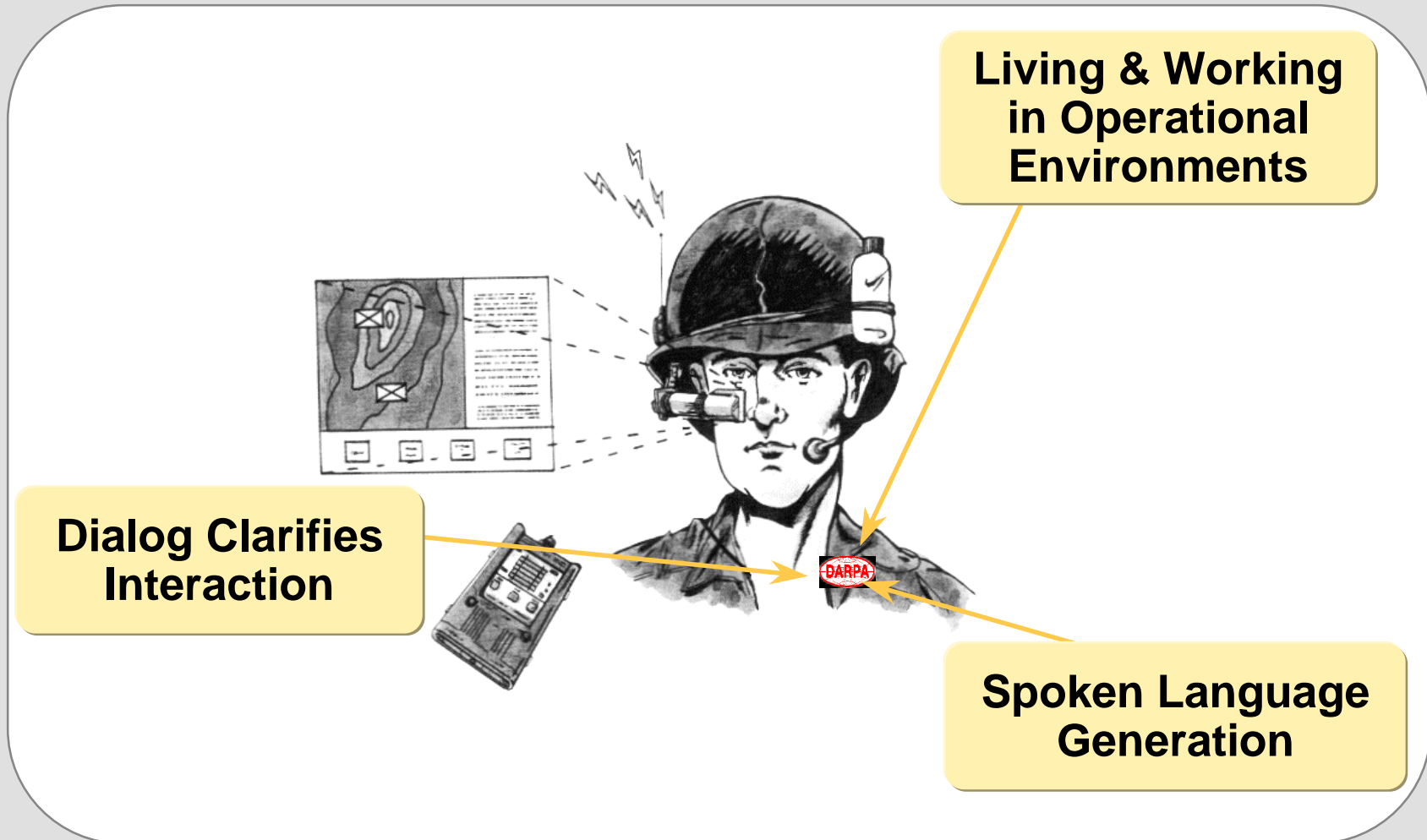**Human language technologies are utilized in different ways**

- Interface: Understand input queries and deliver verbal responses
- Content: Understand weather forecasts and construct a relational database to facilitate flexible access

**Interesting research issues:**

- Displayless Interaction: Audio-only information access and delivery
- Virtual Browsing: Enable user access of Web information w/o a PC
- Information on Demand: Deliver only the information the user wants
- Multilinguality: Both for interface and content
- Robust Speech Recognition/Understanding: Over the phone; rejection

Living & Working in Operational Environments

Dialog Clarifies Interaction

Spoken Language Generation

# What is Communicator? What Do We Do With IT?

**Hands free, networked, mobile interaction: access, create, and distribute information**

## Complex Travel Scenario

▼ With-out keyboard or human assistance make and confirm travel, car, and hotel reservation for a two city three meeting trip

## Project Warrior

▼ In a combat environment the warrior will interact with information and the network to better project power and improve survivability

## Project Command Center

▼ For a Commander and Staff: apply Communicator technology to significantly reduce the crisis response time

# New Technology:
# Dialog Interaction

**Conversation Segmentation**

**Context Tracking**

**W: I need an early flight to send new computers to Bosnia**

**C:** **Where** [from]**?**

**W:** [from] **Washington DC**

**C: OK, there's a Tuesday evening flight out of Andrews arriving 8:38 AM on Wednesday in Frankfurt Germany**

**W:** **No, I prefer** [a flight from Andrews into] **Reimstein Germany.**

**Clarification**

**C:** **How about MAC Flight #1296 arriving Reimstein at 10:45AM on Wednesday?**

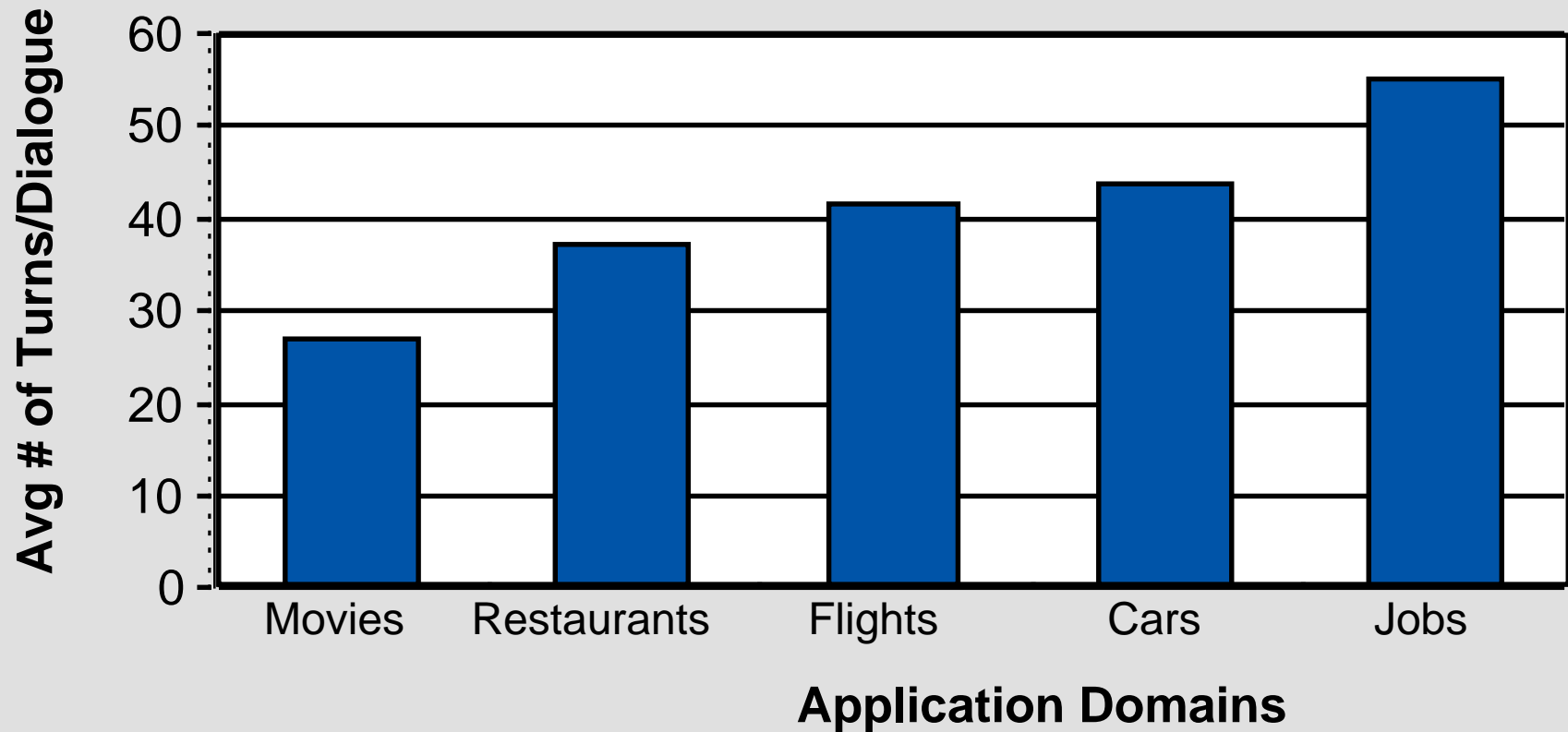**W:** **Is that a C-141 aircraft?**

**C:** **No, it's a C-5.**

**W: OK, arrange for transportation on that flight**

**Confirmation**

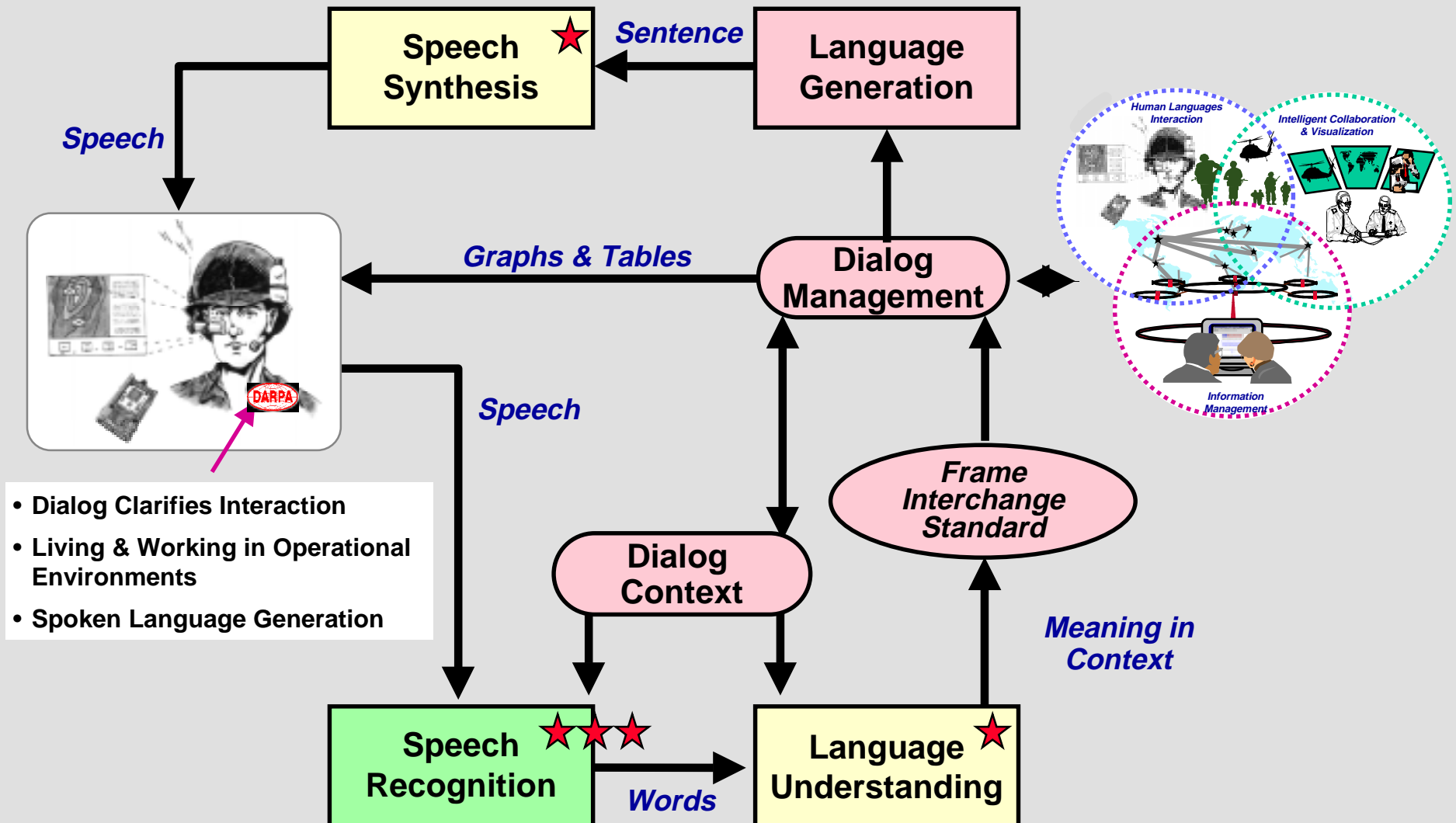# Relationship Between Domains and Dialog Complexity

# Dialog Architecture with Feedback: Changing the Way Warriors Interact With Computers



- **Dialog Clarifies Interaction**
- **Living & Working in Operational Environments**
- **Spoken Language Generation**

*Speech Synthesis* — *Sentence* — *Language Generation*

*Speech*

*Graphs & Tables* — *Dialog Management*

*Speech*

*Dialog Context*

*Frame Interchange Standard*

*Meaning in Context*

*Speech Recognition* — *Words* — *Language Understanding*

*Human Languages Interaction*

*Intelligent Collaboration & Visualization*

*Information Management*

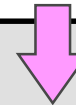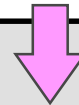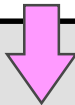# Network-based Communicator Architecture
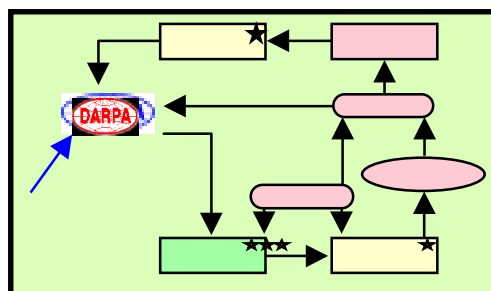
# Road Map
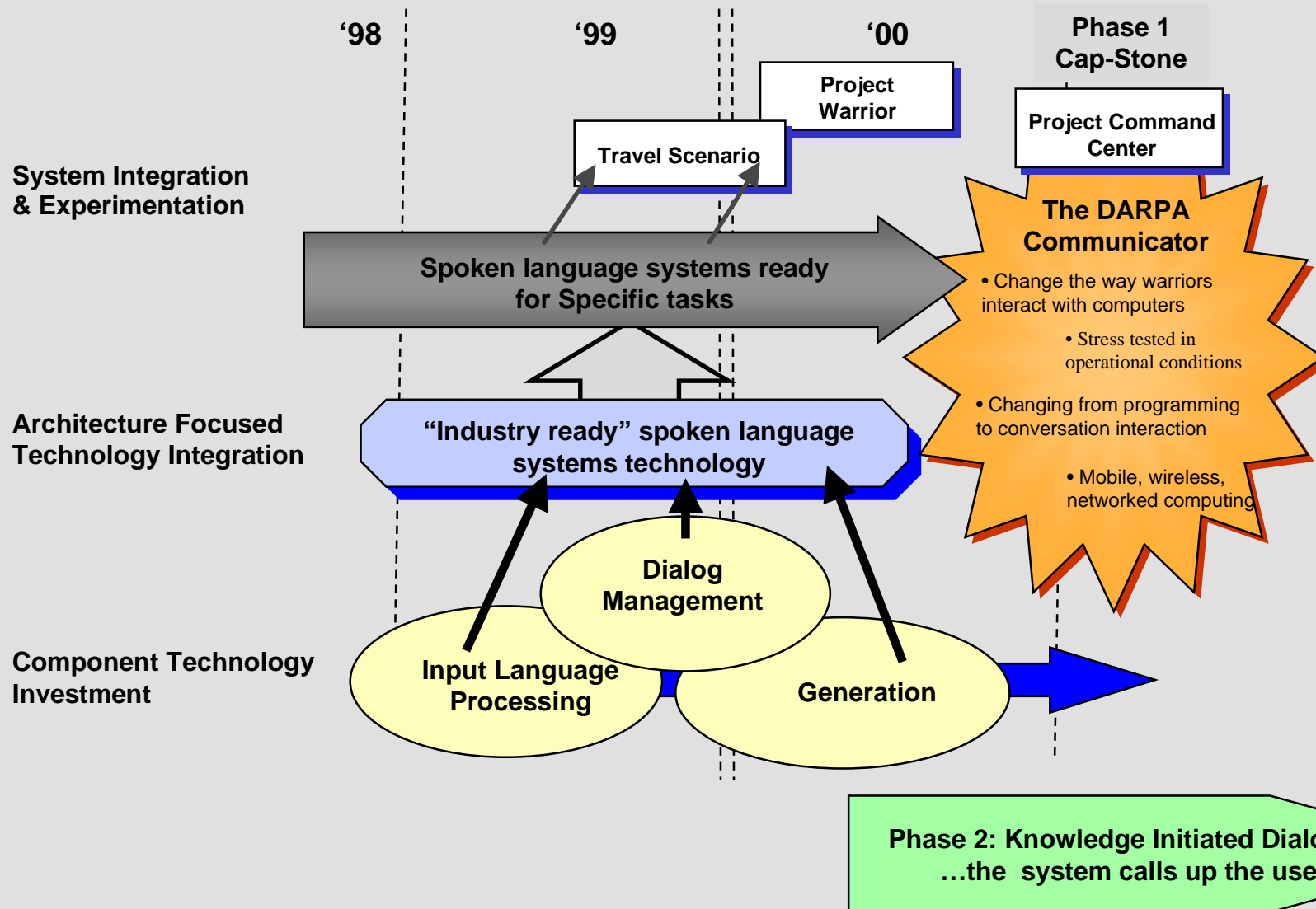
# Metrics Based Evaluation
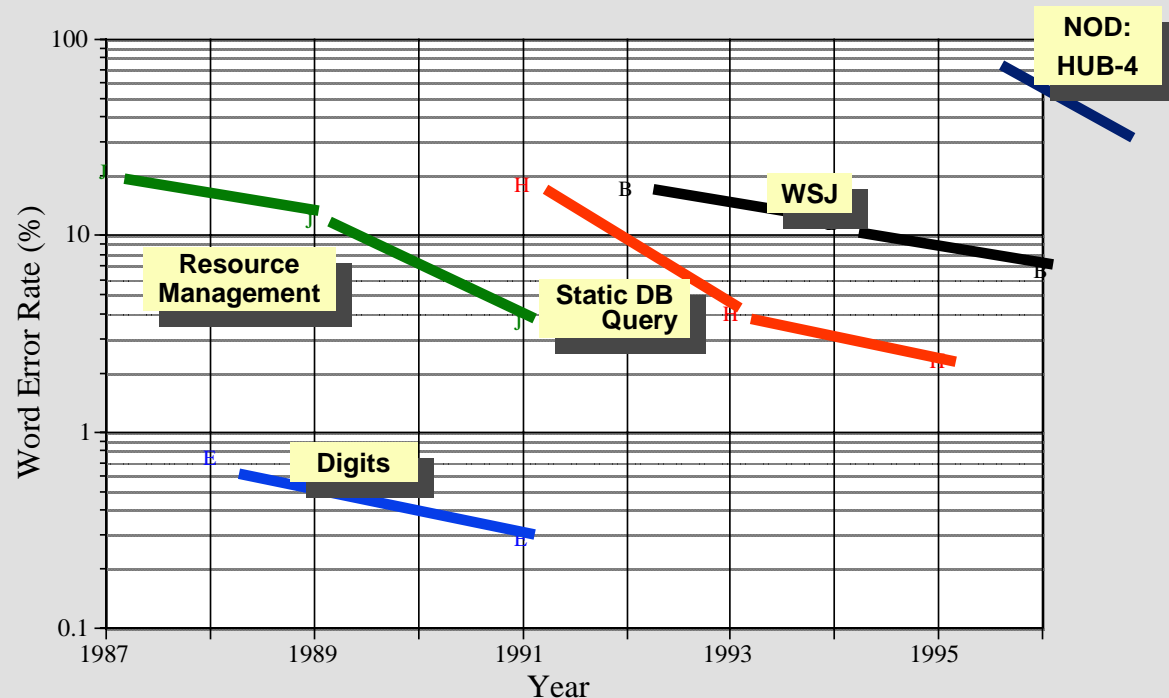
**Technical Capabilities**

Speaker-independent, continuous **speech recognition**

Spontaneous **speech recognition** in a limited domain

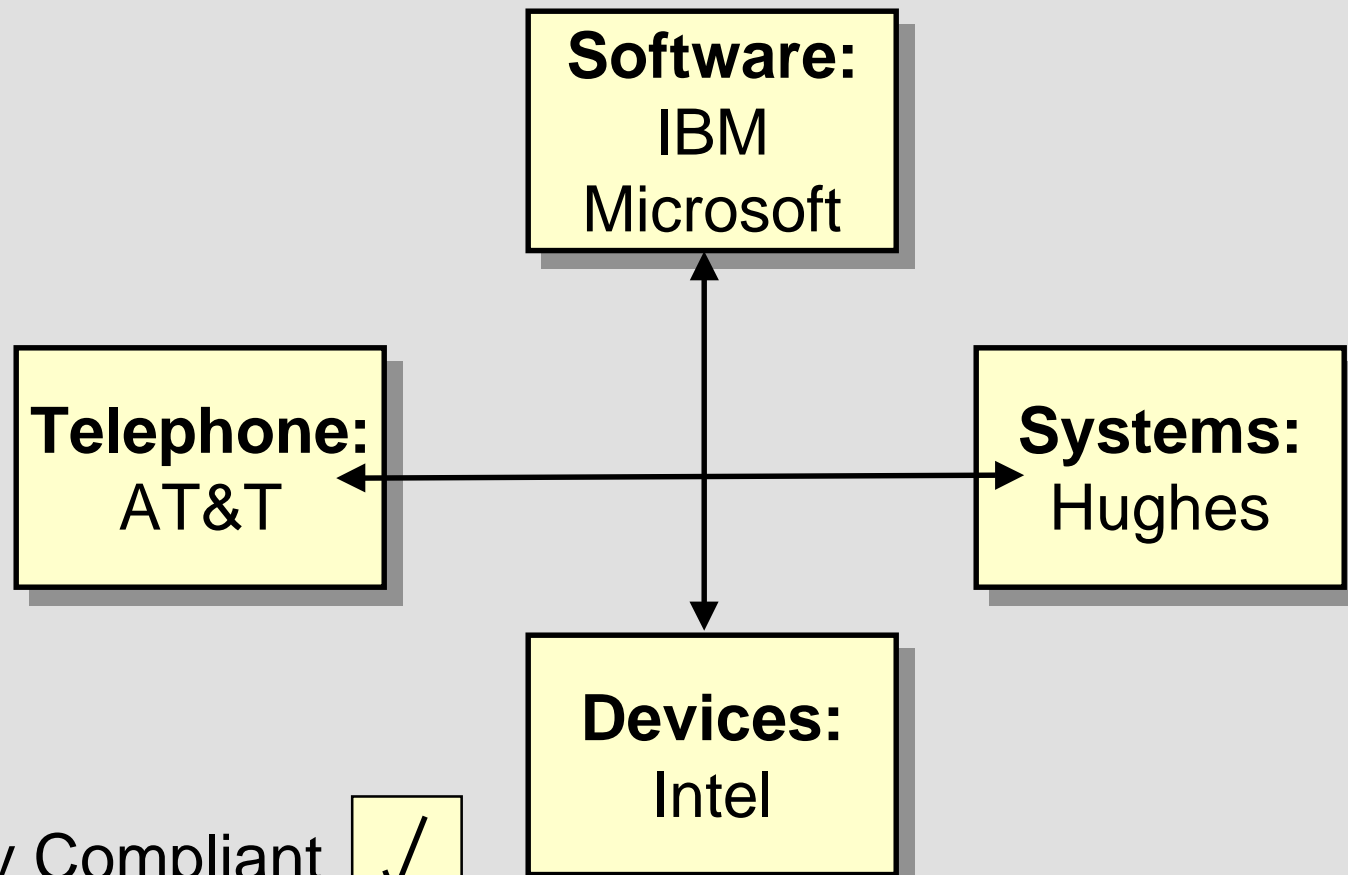**Speech-based systems** in restricted domains

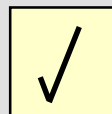**Improving Performance over increasingly complex tasks**

NOD: HUB-4

WSJ

Resource Management

Static DB Query

Digits

Word Error Rate (%)

100

10

1

0.1

1987    1989    1991    1993    1995

Year

# 800# Gorilla Approach to Standards



**Software:**
IBM
Microsoft

**Telephone:**
AT&T

**Systems:**
Hughes

**Devices:**
Intel

- Architecturally Compliant ✓

- Cooperate on Standards ✓
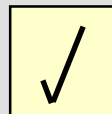
# Cap-stone: Project Warrior

- June 2000…Warfighter in the urban environment:

- Project focused primarily on adapting plans and tactics with warriors operating in small teams. Demonstrate "hand-free" ability to access, create, and distribute information.

- Application Pull: Marines (ETO's LCS - Marine); Navy (Fleet Battle Experiments)

- Working with Smart Modules (ETO), CPOF (ISO), GloMo (ITO)

**Dialog Enhanced Systems:**

- LCS Marine: Information access; Navigation, Smart Forms
- Theater Missile Defense and Call for Fire (push and pull targeting information)
- Database interaction e.g. landmine database: location and status
- Transportation and logistics order status

**Dialog Enhanced Devices:**

- Humvee interaction (Navigation, Sensors, Weapon, Status of troops, etc)
- Intelligent Command Center